

amended to more clearly define the method steps of (a) identifying at least one area of a large processing task directed to a plurality of computational processes that can be grouped together as a task space not dependent on passing of control of processing from an external process in order to complete processing of the computational processes of the task space, and (b) breaking down the task space into a plurality of self-contained task objects each of which can be executed in one computational step without requiring passing of control to or from another object, wherein once all the "data-waiting" slots of a task object are filled, the task object can perform its defined computational step without waiting for any other inputs. The added claim recitations are fully supported in the Specification as originally filed, specifically, Page 11, lines 12-26, and Page 14, line 26, to Page 15, line 2. No new matter is deemed to have been added.

The Suzuki patent generally discloses performing computer graphics rendering by parallel processing in which a time control processing section determines and schedules various kinds of rendering processes when they are ready to be processed so that a display processing section can start generating a calculating section has not completed all calculation processes for rendering the next frame. However, Suzuki does not teach breaking down an overall task into self-contained task objects and assigning task objects ready for processing to any available ("unoccupied") one of a plurality of processors.

The Keller patent goes further in teachings what Suzuki does not, however, Keller handles all computational tasks at once by computing priority rankings and processing times in order to assign the highest priority tasks ready to be assigned to an available processor (Col. 5, lines 42-54), and, as to processing tasks awaiting an event before it is ready for processing, Keller places an event or multi-event token to top of the stack of the requesting process to signal when the event or multi events has/have been fulfilled so that the process can be assigned to a processor (Col. 8, lines 2-13, and lines 48-65). In other words, Keller does not differentiate between different types of processing tasks that may need to await the completion of "events" from other tasks before they are ready for processing. Keller notes that only one process can own an event at a time and that an event will be assigned for ownership to the highest priority process (Col. 11, lines 2-63). This can lead to inefficiencies in assigning ready tasks to available processors if unready high priority tasks are waiting on events that have not been fulfilled and/or

lower priority tasks that could be ready are awaiting passing of ownership of an event from unready higher priority tasks.

The Brobst patent teaches handling parallel processes in groups that employ their own resources (memory address space), wherein each process can include one or more “threads”.

In the present invention, as now more clearly defined in amended Claims 1 and 12, the above-noted inefficiencies in Keller can be minimized or avoided by identifying at least a plurality of computational processes of an overall processing task that can be grouped together as a task space not dependent on passing of control of processing from an external process. This avoids the need to re-assign “ownership” of a dependent event to processing tasks according to their priority rankings. Instead, computational processes of the same priority are grouped together as a defined task space, referred to as “POT Space” in the Specification, for which computation of all processes therein can be performed when ready without passing of control from an external process. In addition, the task space is broken down into a plurality of self-contained task objects each of which can be executed in one computational step without requiring passing of control to or from another object. This avoids the need to issue an event or multi-event waiting token to the stack of a requesting process and then reassign the process when ready according to its priority ranking. In the invention, each task object is defined by a computational step and by its needed data slots, and any task object can be immediately assigned to the next available processor when its "data-waiting" slots are filled. The grouping of processes in a task space that is not dependent on passing control of processing from an external process, and breaking down the task space into self-contained task objects for handling by any available processor in one computational step when their data-waiting slots are filled is not taught or suggested by the combined teachings of Suzuki, Keller, and/or Brobst.

The remaining dependent claims are maintained, with corrections consistent with the amendments to main Claims 1 and 12, and are deemed to be patentable for the same reasons as amended main Claims 1 and 12.

In summary, Claims 1-20 are deemed to be patentably distinct over the cited prior art and in condition for allowance, and it is requested that a Notice of Allowance be issued upon reconsideration.

AUTHORIZATION TO CHARGE DEPOSIT ACCOUNT FOR ANY DEFICIENCY

This response is filed with a certificate of mailing within the time allowed for response, and with total and independent claims after amendment numbering within the limits originally paid for with the filing fee. However, if any fees are deemed to be due for acceptance of this response, authorization is hereby given to charge our Deposit Account No. 502633.

CERTIFICATE OF MAILING:

The undersigned certifies that the foregoing is being mailed on Aug. 27, 2004, by depositing it with the U.S. Postal Service, first class postage paid, addressed to: Mail Stop: Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Respectfully submitted,
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